

CLAIMS

1. A process for synthesis of hydrogen cyanide, comprising:  
reacting methane or methane-containing natural gas, ammonia and oxygen-enriched  
air or oxygen in the presence of a catalyst comprising platinum or a platinum alloy;  
wherein oxygen and nitrogen are present in a molar ratio which satisfies the  
relationship

$$\frac{[O_2]}{[O_2 + N_2]} = 0.25 \text{ to } 1.0;$$

10 wherein methane and ammonia are present in a molar ratio of

$$\frac{[CH_4]}{[NH_3]} = 0.95 \text{ to } 1.05;$$

wherein a molar ratio of ammonia to the sum of oxygen and nitrogen obeys the

following relationship:

$$Y = m \cdot X - a,$$

wherein

$$Y = \frac{[NH_3]}{[O_2 + N_2]}$$

$$X = \frac{[O_2]}{[O_2 + N_2]}$$

$$m = 1.25 \text{ to } 1.40; \text{ and}$$

$$a = 0.05 \text{ to } 0.14.$$

2. The process according to Claim 1, wherein said molar ratio of oxygen and nitrogen

25 is

$$\frac{[O_2]}{[O_2 + N_2]} = 0.25 \text{ to } 0.40.$$

3. The process according to Claim 1, wherein said molar ratio of methane and

30 ammonia is

$$\frac{[CH_4]}{[NH_3]} = 0.98 \text{ to } 1.02.$$

4. The process according to Claim 1, wherein  $m = 1.25 \text{ to } 1.33$  and  $a = 0.07 \text{ to } 0.11$ .

35 5. The process according to Claim 1, wherein the starting-gas mixture is preheated to  
at most 150°C.

6. The process according to Claim 1, wherein a volume flow for ammonia and methane or the methane-containing natural gas is calculated and controlled as a function of a molar ratio  $X = O_2/(N_2 + O_2)$  using a process control system.

5        7. The process according to Claim 1, wherein said methane-containing natural gas contains at least 88 vol.% of methane.

10      8. The process according to Claim 1, wherein said process is performed in a conventional Andrussow-reactor.

15      9. A process for synthesis of hydrogen cyanide by the Andrussow method, comprising:

20      reacting a mixture of methane or methane-containing natural gas, ammonia and oxygen-enriched air or oxygen in the presence of a catalyst at an elevated temperature; wherein a ratio

$$\frac{[O_2]}{[O_2 + N_2]} > 0.4 \text{ to } 1.0 \text{ (vol/vol); and}$$

25      wherein said reacting is performed in a conventional Andrussow reactor.

30      10. The process according to Claim 9, wherein a molar ratio

$$\frac{CH_4}{NH_3}$$

35      in said mixture mixture is 0.95 to 1.05 (mol/mol).

40      11. The process according to Claim 9, wherein an oxygen stream is intensively mixed with an air stream before adding methane or methane-containing natural gas and ammonia.

45      12. The process according to Claim 9, wherein a methane or natural-gas stream and an ammonia stream are mixed before adding into an air-oxygen or an oxygen stream.

50      13. The process according to Claim 9, wherein said mixture is preheated to at most 200°C.

55      14. The process according to Claim 9, wherein said mixture is preheated to at most 150°C.